Institut für Industrielle Informationstechnik
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Master's Thesis

Multi-Instrument Music Transcription with Source Separation and End-to-End Models

Motivation

The goal of this thesis is to investigate methods for multi-instrument music transcription for classical music or rock music. Approaches will be considered that first perform source separation to isolate individual instrument tracks, as well as end-to-end models that generate symbolic descriptions directly from the mixed audio signal. The thesis therefore addresses a scientifically and practically highly relevant research question at the intersection of signal processing, machine learning, and automatic music transcription.

Task Description

As part of this thesis, existing methods for multi-instrument music transcription will first be researched and analyzed. In particular, pipeline approaches based on source separation as well as modern end-to-end models for the direct transcription of complex music signals will be considered. Depending on the focus of the thesis, the emphasis may be placed on classical music or rock music.

Subsequently, a suitable methodological concept will be developed and implemented in practice. This may include, for example, the combination of a source separation module with instrument-specific transcription models, or the evaluation of an end-to-end approach on suitable datasets. In this process, appropriate audio representations, model architectures, and training strategies will be investigated and compared.

Finally, the developed system will be evaluated using suitable datasets. The quality of the transcription will be assessed using established metrics, and the strengths and weaknesses of the investigated approaches will be discussed with respect to different instrumentations, musical styles, and instrument-specific challenges.

Prerequisites

- Very good programming skills in Python
- Basic knowledge of Machine Learning or Deep Learning
- Interest in signal processing, audio analysis, or Music Information Retrieval
- Enjoyment of scientific work

Research Area

- Music Information Retrieval
- Signal Processing
- Deep Learning
- Source Separation
- Automatic Music Transcription

Degree Program

- [x] Electrical Engineering and Information Tec
- [x] Computer Science
- [x] Music Informatics (HfM Karlsruhe)

Focus

- [x] Signal Analysis
- [x] Modeling
- [x] Implementation

Start

Immediately

Links

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Contact

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